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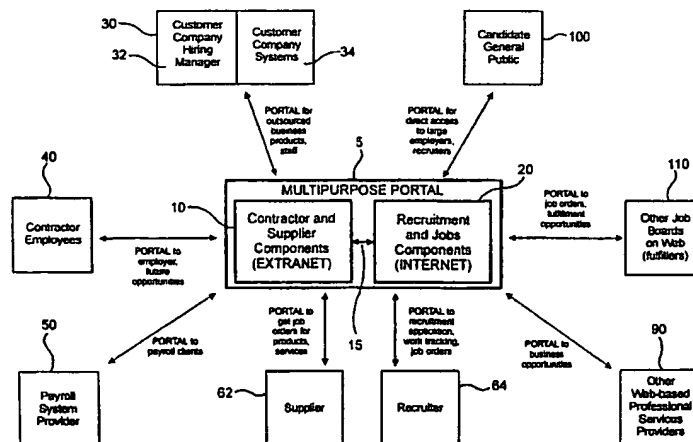
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(54) Title: NETWORK BASED HUMAN RESOURCES INFORMATION MANAGEMENT SYSTEM



(57) Abstract: A multipurpose human resources service portal apparatus (5) includes a first computer having a processor, main memory, storage subsystem, high-speed connection to the internet, and a contractor computer program (10) means for communicating with contractor organizations. The contractor component stores, maintains, and retrieves information concerning the contractor organizations. A supplier component computer program (10) communicates with supplier organizations and stores, maintains, and retrieves information concerning the supplier organizations. A recruitment component computer program (20) communicates with recruitment organizations, and stores, maintains, and retrieves information concerning recruitment organizations. A jobs component computer program (20) means communicates with job candidates, and stores, maintains, and retrieves information concerning the job candidates.

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## **Network Based Human Resources Information Management System**

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### **Cross-Reference to Related Application**

This application claims the benefit of U.S. Provisional Patent Application  
Serial No. 60/142,205, filed July 2, 1999.

10

### **Field of Invention**

This invention relates to automated human resources systems, and more  
particularly to World Wide Web-based human resources systems.

### **Background of the Invention**

The term "extranet", as used herein, refers to a network which serves a business,  
government or other organization or entity, and which exists as an identifiable, navigable  
subnetwork within the Internet or other larger network, sharing some levels and types of  
Internet resources with other Internet users.

15

The term "intranet", as used herein, refers to a network which serves a business,  
government or other organization or entity, and which exists as an identifiable, navigable  
subnetwork possibly connected to the Internet or other larger network, but not sharing  
Internet resources with other Internet users.

20

The term "sub-tier vendor", as used herein, refers to a supplier of services to other  
vendors who, in turn, directly serve a company or other organization.

25

The term "succession planning", as used herein, refers to the process of insuring  
smooth transitions in a business across changes in management staff and direction.

Proprietary and commercial application-specific computer systems supporting  
human resource management have been in widespread use. The advent of the World

Wide Web, coupled with advances in secure communications, intranets, extranets, and standard methods and interfaces, has facilitated the development of Web-based networks and applications. Certain of these networks and applications are capable of supporting enterprise-wide human resource information sharing, with strong  
5 connections to service suppliers outside the companies they serve. Such service suppliers are in need of systems and components which facilitate their extension of human-resource services to an expanding range of companies.

The state of this art is embryonic. Proposals and ideas for fully-interconnected systems of human resource applications exist, but the actual design and development  
10 of workable, comprehensive products is scarce. The field, as reflected in the existing art, comprises applications encompassing only limited segments of the enterprise-wide range of possibilities.

The following patents address the problem of fitting human resources, or people, to the work to be done (i.e., task assignment): U.S. Patent No. 6,070,143  
15 (Barney et al.); U.S. Patent No. 6,049,776 (Donnelly et al.); U.S. Patent No. 6,023,702 (Leisten et al.); U.S. Patent No. 5,765,140 (Knudson et al.); U.S. Patent No. 5,416,694 (Parrish et al.). None of these patents addresses recruitment or job application management, nor do they address contract time and cost.

The following patents address the problem of matching job applications to  
20 staffing vacancies: U.S. Patent No. 5,978,768 (McGovern et al.); U.S. Patent No. 5,884,270 (Walker et al.); U.S. Patent No. 5,832,497 (Taylor). None of these patents addresses task assignment, project management, or contract time and cost.

The following patents address the problem of project management: U.S.

Patent No. 6,076,105 (Wolff et al.); U.S. Patent No. 6,023,702 (Leisten et al.); U.S.

Patent No. 5,826,252 (Wolters, Jr. et al.); U.S. Patent No. 5,765,140 (Knudson et al.);

U.S. Patent No. 5,557,515 (Abbruzzese et al.); U.S. Patent No. 5,548,506

5 (Srinivasan). None of these patents addresses task assignment, recruitment or job application management, contract time and cost, or payroll.

The following patent addresses the problem of personal calendar coordination and sharing: U.S. Patent No. 5,867,822 (Sankar). It does not address any other applications.

10 The following patent addresses the problem of payroll information and employee code information storage and management: U.S. Patent No. 5,600,554 (Williams). It does not address any other applications.

The following patent addresses the problem of workforce planning and occupational readjustment: U.S. Patent No. 5,416,694 (Parrish et al.). Apart from  
15 task assignment, it does not address any other applications.

The above survey of the prior art shows that the integration of a comprehensive set of human resource applications, such as, for example, applications addressing each of hiring, contract time and cost, project management, recruitment -- has not been accomplished. Furthermore, none of the listed patents appear to exploit  
20 the advantages of the World Wide Web, such as, for example, the availability of a standardized range of interfaces, global access to individuals and systems, the capacity to rapidly create, integrate, and maintain a highly-varied range of

applications in an efficient manner, and ease of use unparalleled in all but the most carefully-constructed and proprietary systems.

These advantages of the World Wide Web open the door to the integration of all of the human resources applications listed above. the list not intended to be  
5 exhaustive or limiting. Such integration would provide significant advantages to the employers and employees availing themselves of the Web's rich and well-connected information environment. Furthermore, the opportunities are growing for service organizations which are capable of providing major segments of the full range of human resources applications to companies trying to reduce their in-house costs of  
10 such applications. A demonstrable need exists for robust, adaptable, efficient systems which transfer the upkeep, administration and ongoing development of human resource applications to a range of competitive external organizations. An additional need exists for systems strongly interconnected across the World Wide Web to maximize the productive interactions among company organizations and those outside  
15 the company.

Therefore, what is needed in the art is an apparatus and/or process that interconnects and integrates a comprehensive set of human resource applications, such as, for example, applications addressing each of hiring, contract time and cost, project management, and recruitment.

20 Furthermore, what is needed in the art is an apparatus and/or process which transfers, in a robust, adaptable, and efficient manner, the upkeep, administration and development of human resource applications to a competitive external organizations.

Moreover, what is needed in the art is an apparatus and/or process for the management of human resources and human resource systems which is interconnected across the World Wide Web to maximize the productive interactions among company organizations and those outside the company.

5

### Summary of the Invention

The present invention provides a multipurpose human resources service portal apparatus.

The present invention comprises, in one form thereof, a first computer having a processor, main memory, storage subsystem, high-speed connection to the Internet, and  
10 a contractor component computer program means for communicating with contractor organizations. The contractor component stores, maintains, and retrieves information concerning the contractor organizations. A supplier component computer program communicates with supplier organizations, and stores, maintains, and retrieves information concerning the supplier organizations. A recruitment component computer  
15 program communicates with recruitment organizations, and stores, maintains, and retrieves information concerning the recruitment organizations. A jobs component computer program means communicates with job candidates, and stores, maintains, and retrieves information concerning the job candidates.

An advantage of the present invention is that it enables, with the use of the World  
20 Wide Web, the integration of, for example, the functions of staffing, employment contract management, project management, and recruitment into a coherent set of information-sharing and process-sharing applications that operate using competitive outsourced service provision.

A further advantage of the present invention is the reduction of costs incurred in providing these services.

A still further advantage of the present invention is that it eliminates duplication of data, obviates error reconciliations, eliminates information-passing delays, avoids  
5 obstructive and obscure interfaces, provides common access using well-known Web standards, simplifies user interactions, and brings human resources information management into a single, shared, well-managed environment.

Moreover, an advantage of the present invention is that it provides an information access and management point for one or more external organizations.

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#### **Brief Description of Drawings**

The above-mentioned and other features and advantages of this invention, and the manner of attaining them, will become apparent and be better understood by reference to the following description of one embodiment of the invention in conjunction with the accompanying drawings, wherein:

15

Figure 1 shows the general environment of the invention as it is connected to its using organizations;

Figure 1A shows an overview of the message flow between the invention and its using organizations;

20

Figure 2 shows the message flow between the invention and a customer company, a public access point, and a supplier or recruiter, during the search for a job candidate;

Figure 3 shows the message flow between the invention and a customer company, a job boards on the Internet, and a supplier or recruiter;

Figure 4 shows the message flow between the invention and a customer company, a public access point, and a supplier or recruiter, during the application process;

Figure 5 shows the message flow between the invention and a customer company, a public access point, a supplier, and a recruiter, emphasizing the exchange between the invention's extranet component and its Internet component;

Figure 6 shows the message flow between the invention's extranet components, a contractor employee, and a customer company for payroll functions;

Figure 7 shows the overall activity flow during the hiring process;

Figure 8 shows the issuance of job details during the hiring process;

Figure 9 shows the receipt of applications during the hiring process;

Figure 10 shows applicant screening during the hiring process; and

Figure 11 shows applicant selection and notification during the hiring process.

Corresponding reference characters indicate corresponding parts throughout the several views. The exemplification set out herein illustrates one preferred embodiment of the invention, in one form, and such exemplification is not to be construed as limiting the scope of the invention in any manner.

#### **Detailed Description of the Invention**

Refer to Figures 1 and 1A. Figure 1 shows the invention's general overview, and Figure 1A shows a first-level breakdown of the invention's components and messaging. Multipurpose portal 5 includes two interworking components to serve all client organizations and individuals. Labor activity management system 10 serves protected extranet clients, and recruitment, job application and resume management system 20 serves clients having public access via the Internet.



Labor activity management system 10 includes two major components, contractor component 12 and supplier component 14 (Fig. 1A). Contractor component 12 manages and records transactions among customer companies 30, contractor employees 40, and payroll service providers 50. Supplier component 14 manages and records transactions among customer companies 30, external suppliers 62, external recruiters 64, external sub-tier vendors 66, and external professional service providers 90. Supplier component 14 also manages and records intrasystem transactions 15 between customer companies 30 and the recruitment, job application and resume management system 20 for external public clients 100 having access via the Internet.

Recruitment and jobs component 20 manages and records transactions among external suppliers 62, external recruiters 64, external sub-tier vendors 66, other job boards 110 on the Web, other Web-based professional outsource service providers 120 and candidates and general public clients 100 having Internet access.

Figure 2 shows the invention's process of locating candidates for a customer company 30. First, hiring manager 32 sends a job order 31 to the contractor component 12, which distributes the job order via the supplier component 14 to the recruitment component 22 and the jobs component 24. Each in turn then send out an order for candidates. Supplier component 14 sends an extranet order 37B for candidates to the customer company's set of suppliers, recruiters and subtier vendors 60. Alternatively or in concert with supplier component 14, jobs component 24 sends an Internet order 37A for candidates to a comprehensive set of suppliers, recruiters and subtier vendors 60. Alternatively or in concert with supplier component 14 and jobs component 24, recruitment component 22 sends an Internet order for candidates 33 out to the candidates

and the general public 100. Replies to the orders for candidates are returned along the same respective paths to supplier component 14. Supplier component 14 then returns a list of candidates 39A to customer company 30.

Figure 3 shows the invention's connections with other job boards (job and resume posting bulletin boards) 110 on the World Wide Web, such as, for example, Monster.com, Nettemps, and CE Weekly. A customer company 30 sends an order for candidates 31A to the contractor component 12. Via the recruitment component 22 and the jobs component 24, orders for candidates 35 are then sent to the other job boards 110 on the Web. Other job boards 110 respond with candidate lists 39B to the recruitment and jobs components 22, 24. The contractor component 12 returns candidate lists 39A to customer company 30.

Customer company 30 may use the services of one or more suppliers, recruiters and sub-tier vendors 60. Still referring to Figure 3, job suppliers 60 send orders for candidates 37A to supplier component 14. Recruitment component 22 sends orders 35 to other job boards 110, which respond with lists of candidates 39B. Candidate lists 39B are then sent via supplier component 14 as candidate lists 39C to the originating suppliers, recruiters and sub-tier vendors 60.

General public access to a customer company 30 and its job suppliers 60 via the invention is shown in Figure 4. A customer company 30 or a supplier, recruiter or sub-tier vendor 60 issues an order for a candidate 31B or 37A, respectively. The invention routes the order out directly as job order 31C to the general public 100 in the form of electronic mail. A responding candidate 100 returns an application package comprising job order 31C, resume 101 and application 103. The invention sends the returned

application package to the requesting customer company 30 or the supplier 60 as a candidate response 39E or 39F respectively.

It should be noted that in the exchanges of messages shown in these processes, the boundaries among commercial entities are as fluid as can be achieved through the use of the World Wide Web. Where existing applications limit themselves to dialogues between pairs of entities -- employers and employees, employers and contract organizations, recruiters and applicants -- the invention mediates among combinations of commercial entities to achieve an integrated result: the productive connection of a capable candidate with a job requirement, regardless of the specific business arrangements among candidate, contractor, recruiter, supplier, company, or website.

This point is further made clear in the process shown in Figure 5, which illustrates the paths of orders for candidates among recruiters, candidates and the public, sub-tier vendors, and customer companies, with the invention at the hub of this traffic. As can be seen from this figure, the paths by which a candidate may be connected with a job are restricted only by the number of distinct providers who may be competing to make that connection. Regardless of which provider or providers are involved, the invention mediates the entire process.

As a further illustration of the invention's processes, Figure 6 shows an extranet payroll connection among the invention's supplier 14 and contractor 12 components, a customer company 30 and a contract employee 40. Contract employee 40 submits timesheets and expense reports 41 to contractor component 12, and payroll details and other communications 45 are returned. Approvals 43 for all contractor time and expense

are submitted to contractor component 12 from customer company 30. Contractor component 12 keeps records of all transactions.

A narrative of the invention's operation in the recruitment process is shown in Figures 7 through 11. Figure 7 shows the overview of this process, in four stages. Note the invention's Web connections among company ERP systems, other Web-based service providers for ERP, payroll, and other outsourced services, and a customer company's human resources IS applications. As mentioned earlier, the boundaries between a company, its service providers, its recruiters and its workers are highly fluid.

To summarize, the invention comprises the following service processes:

Job ordering: The invention provides for creation of new job requisitions via an on-line form and processing which it makes available to authorized users. The invention provides on-line forms and processing for immediate on-line access to newly-created job orders. The invention further provides on-line forms and processing to suppliers, for review of job requisitions and for submission of candidates for specific positions directly to a customer representative.

Candidate submittal and review: The invention provides data archiving and detailed tracking options, together with on-line forms, so that customer human resources and hiring managers can review, screen, and update the status of candidates proposed for assignment.

Associate supplier integration: Because all posted job orders are immediately available for all suppliers to access, the invention provides all suppliers with the same level of opportunity to review job requisitions and submit qualified candidates.

Electronic mail technologies: Incorporating automated electronic reminders and feedback messaging, the invention uses Web programming technologies to "push" requests automatically from suppliers and candidates to requesting managers.

5 Real-time access to candidates: The invention provides immediate access to databases identifying newly submitted candidates. Making candidate resumes available as soon as they are submitted helps reduce both cycle time and administrative cost.

Status availability at all times: The invention updates status information regarding submitted candidates as soon as a status change is entered. The invention also provides Web access to customers who wish to check its browser-based system for order  
10 and requisition status information at any time from any location.

Site Segregation: To provide customer human resources and hiring managers with full control of information, the invention provides customized secure access so that only authorized personnel may access certain information, such as notes on a candidate or assignment decision.

15 Project tracking: The invention records all use of time for contract employees, taking full advantage of all information provided in the time records to support the production of project tracking reports for a customer company.

The invention's set of significant messages comprises the transactions shown in Table 1. To simplify reading the table, it should be noted that all messages flow either  
20 to an invention component or from an invention component. This reveals that the design supports the invention's management of all transactions among the organizational and individual entities it serves.

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Transaction ID	Triggering Event	Message	Message Source	Message Destination
1	Staffing request	Job Order	Customer Hiring Manager/HR Dept.	Invention Supplier Component
2	Job Order Receipt	Job Order	Invention Supplier Component	Invention Recruitment Component
3	Job Order Receipt	Job Order	Invention Supplier Component	Supplier / Recruiter / Sub-Tier Vendor
4	Job Order Receipt	Job Order	Invention Supplier Component	Other Web-Based Professional Service Providers
5	Job Order Receipt	Job Order	Invention Recruitment Component	Candidates / General Public
6	Job Order Receipt	Job Order	Invention Recruitment Component	Other Job Boards on Web
7	Job Order Receipt	Job Order	Invention Recruitment Component	Other Web-Based Professional Service Providers
8	Candidate Found	Candidate Response	Supplier / Recruiter / Sub-Tier Vendor	Invention Supplier Component
9	Candidate Found	Candidate Response	Supplier / Recruiter / Sub-Tier Vendor	Invention Recruitment Component
10	Candidate Found	Candidate Response	Other Web-Based Professional Service Providers	Invention Recruitment Component
11	Candidate Found	Candidate Response	Candidates / General Public	Invention Recruitment Component
12	Candidate Found	Candidate Response	Other Job Boards on Web	Invention Recruitment Component
13	Candidate Found	Candidate Response	Invention Recruitment Component	Invention Supplier Component
14	Candidate Found	Candidate Response	Invention Supplier Component	Customer Hiring Manager/HR Dept.
15	Time Worked	Timesheet	Contractor Employee	Invention Contractor Component
16	Timesheet Receipt	Timesheet	Invention Contractor Component	Customer Hiring Manager
17	Timesheet Receipt	Timesheet Approval	Customer Hiring Manager	Invention Contractor Component

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18	Timesheet / Timesheet Approval Receipt	Timesheet	Invention Contractor Component	Payroll Service Provider
19	Expense Incurred	Expense Report	Contractor Employee	Invention Contractor Component
20	Expense Report Receipt	Expense Report	Invention Contractor Component	Customer Hiring Manager
21	Expense Report Receipt	Expense Report Approval	Customer Hiring Manager	Invention Contractor Component
22	Expense Report & Approval Receipt	Invoice	Invention Contractor Component	Payroll Service Provider
23	Pay Summaries	Scheduled Transaction	Payroll Service Provider	Invention Contractor and Supplier Components
24	Contractor List	Scheduled Transaction	Invention Contractor Component	Customer Hiring Manager
25	Invoicing Summary	Scheduled Transaction	Invention Contractor Component	Customer Hiring Manager
26	Payrolling Request	Hire	Customer Hiring Manager	Invention Contractor Component
27	Status Update Request	Scheduled Transaction	Customer Hiring Manager	Invention Supplier Component
28	Status Update Response	Scheduled Transaction	Invention Supplier Component	Customer Hiring Manager
29	System Administration Inputs	Administrator Action	Invention Administration Staff	Invention Contractor and Supplier Components
30	System Administration Outputs	System Response to Administration Action	Invention Contractor and Supplier Components	Invention Administration Staff
31	Job Order Receipt	Job Order	Supplier / Recruiter / Sub-Tier Vendor	Invention Recruitment Component
32	Candidate Found	Candidate Response	Invention Recruitment Component	Supplier / Recruiter / Sub-Tier Vendor

**Table 1. Message Set****Conclusion, Ramifications, and Scope of Invention**

From the above descriptions, figures and narratives, the invention's advantages  
5 in integrating recruitment and payroll functions across many participating individuals and  
independent organizations should be clear.

While encompassing recruitment and payroll functions in the preferred  
embodiment, the invention's features and capabilities clearly can be extended to  
workforce forecasting, performance measurement, training management, benefits,  
10 succession planning, and related human resources functions.

While this invention has been described as having a preferred design, the present  
invention can be further modified within the spirit and scope of this disclosure. This  
application is therefore intended to cover any variations, uses, or adaptations of the  
present invention using the general principles disclosed herein. Further, this application  
15 is intended to cover such departures from the present disclosure as come within the  
known or customary practice in the art to which this invention pertains and which fall  
within the limits of the appended claims.



**Claims**

1. A multipurpose human resources service portal apparatus, comprising:  
a first computer including a processor, a main memory, a storage subsystem, and  
a high-speed connection to the Internet;

5 a contractor component computer program means for communicating with other  
organizations, systems and individuals comprising contract workers, customer  
companies, payroll service providing companies, and other computer programs, and for  
storing, maintaining, and retrieving information concerning said organizations and  
individuals;

10 a supplier component computer program means for communicating with other  
organizations, systems and individuals comprising customer company hiring managers,  
customer company information systems, staff suppliers, recruiters, sub-tier vendors, other  
Web-based professional service providers, and other computer programs, and for storing,  
maintaining, and retrieving information concerning said organizations and individuals;

15 a recruitment component computer program means for communicating with other  
organizations, systems and individuals comprising staff suppliers, recruiters, sub-tier  
vendors, other Web-based professional service providers, and other computer programs,  
and for storing, maintaining, and retrieving information concerning said organizations  
and individuals; and

20 a jobs component computer program means for communicating with other  
organizations, systems and individuals comprising job candidates, the general public,  
other job and resume bulletin boards on the World Wide Web, and other computer

programs, and for storing, maintaining, and retrieving information concerning said organizations and individuals.

2. The apparatus of claim 1, wherein said web-based professional service providers  
5 comprise payroll service providers.

3. The apparatus of claim 1, wherein said web-based professional service providers  
comprise relocation service providers.

10 4. The apparatus of claim 1, wherein said web-based professional service providers  
comprise project management service providers.

5. The apparatus of claim 1, wherein said web-based professional service providers  
comprise performance measurement service providers.

15 6. The apparatus of claim 1, wherein said web-based professional service providers  
comprise workforce forecasting service providers.

7. The apparatus of claim 1, wherein said web-based professional service providers  
20 comprise succession planning service providers.

8. The apparatus of claim 1, wherein said web-based professional service providers  
comprise compensation management service providers.

9. The apparatus of claim 1, wherein said web-based professional service providers comprise training management service providers.

10. A multipurpose human resources service portal apparatus comprising:

5 a first computer including a processor, a main memory, a storage subsystem, and a high-speed connection to the Internet;

one or more computer program means for communicating with other organizations, systems and individuals and other computer programs, and for storing, maintaining, and retrieving information concerning said organizations and individuals;

10

11. The apparatus of claim 10, wherein said organizations, systems and individuals comprise contract workers, customer companies, payroll service providing companies.

12. The apparatus of claim 10, wherein said organizations, systems and individuals  
15 comprise at least one of customer company hiring managers, customer company information systems, staff suppliers, recruiters, sub-tier vendors, and other Web-based professional service providers.

13. The apparatus of claim 10, wherein said organizations, systems and individuals  
20 comprise at least one of staff suppliers, recruiters, sub-tier vendors, and other Web-based professional service providers.

14. The apparatus of claim 10, wherein said organizations, systems and individuals comprise at least one of job candidates, the general public, other job and resume bulletin boards on the World Wide Web.
- 5 15. The apparatus of claim 10, wherein said organizations, systems and individuals comprise payroll service providers.
16. The apparatus of claim 10, wherein said organizations, systems and individuals comprise relocation service providers.
- 10 17. The apparatus of claim 10, wherein said organizations, systems and individuals comprise project management service providers.
18. The apparatus of claim 10, wherein said organizations, systems and individuals  
15 comprise performance measurement service providers.
19. The apparatus of claim 10, wherein said organizations, systems and individuals comprise workforce forecasting service providers.
- 20 20. The The apparatus of claim 10, wherein said organizations, systems and individuals comprise succession planning service providers.

21. The apparatus of claim 10, wherein said organizations, systems and individuals comprise compensation management service providers.
22. The apparatus of claim 10, wherein said organizations, systems and individuals  
5 comprise training management service providers.
23. A multipurpose human resources service management method, comprising:  
connecting a first computer to one or more customer companies;  
connecting said first computer to the Internet;  
10 connecting said first computer to one or more contractor employees via an extranet;  
connecting said first computer to one or more staff suppliers;  
connecting said first computer to one or more recruiters;  
connecting said first computer to one or more sub-tier vendors;  
15 connecting said first computer to one or more job candidates;  
connecting said first computer to one or more job and resume bulletin boards on the World Wide Web;  
connecting said first computer to one or more Web-based professional service providers;  
20 connecting said first computer to one or more staff suppliers;  
providing mutual access among all individuals, organizations and systems to which said first computer is connected;

providing means for each of said individuals, organizations and systems to evaluate and select from alternatives for buying and selling services from each of said individuals, organizations and systems; and

5 maintaining records of transactions among said individuals, organizations and systems to which said first computer is connected.

24. The method of Claim 23, wherein said Web-based professional service providers provide payroll management services.

10 25. The method of Claim 23, wherein said Web-based professional service providers provide relocation services.

26. The method of Claim 23, wherein said Web-based professional service providers provide project management services.

15 27. The method of Claim 23, wherein said Web-based professional service providers provide performance measurement services.

20 28. The method of Claim 23, wherein said Web-based professional service providers provide workforce forecasting services.

29. The method of Claim 23 wherein said Web-based professional service providers provide succession planning services.

30. The method of Claim 23, wherein said Web-based professional service providers provide compensation management services.

31. The method of Claim 23, wherein said Web-based professional service providers provide training management services.

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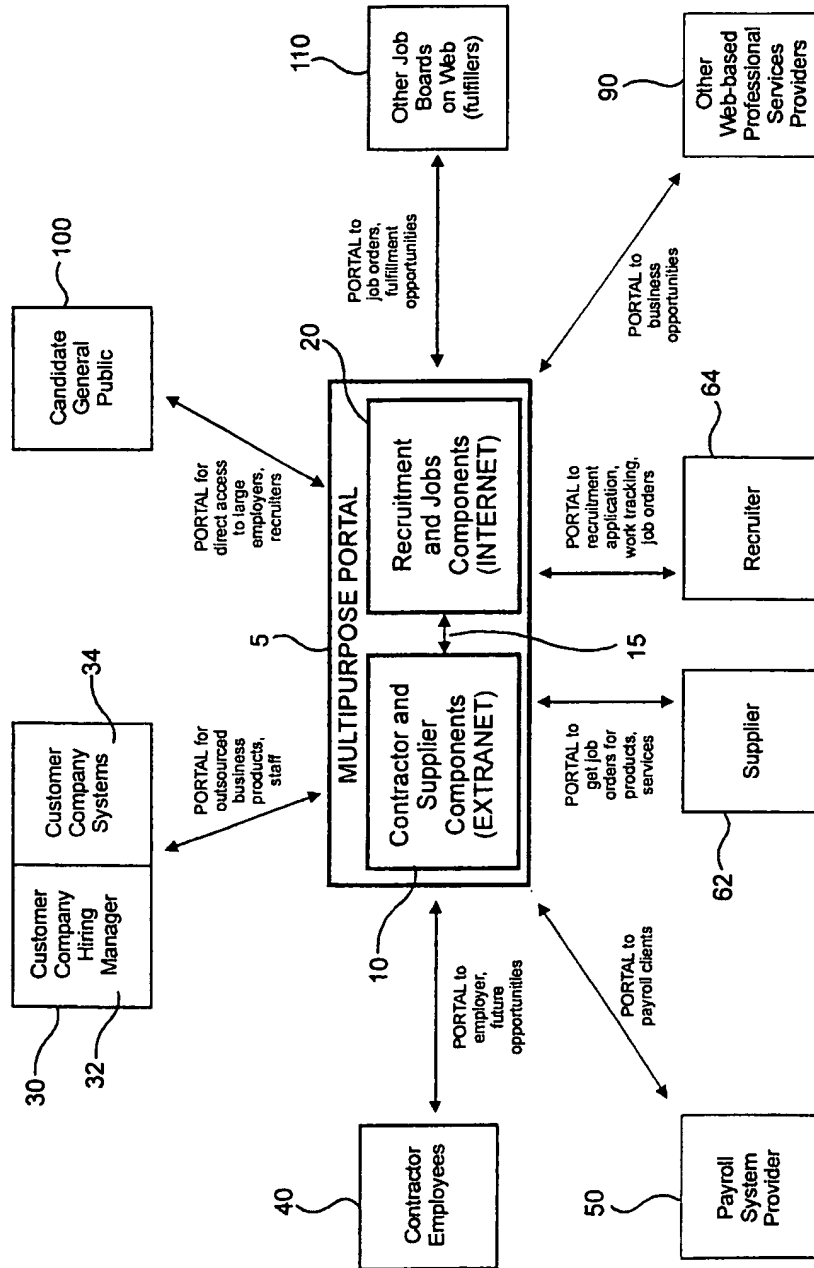


FIG. 1



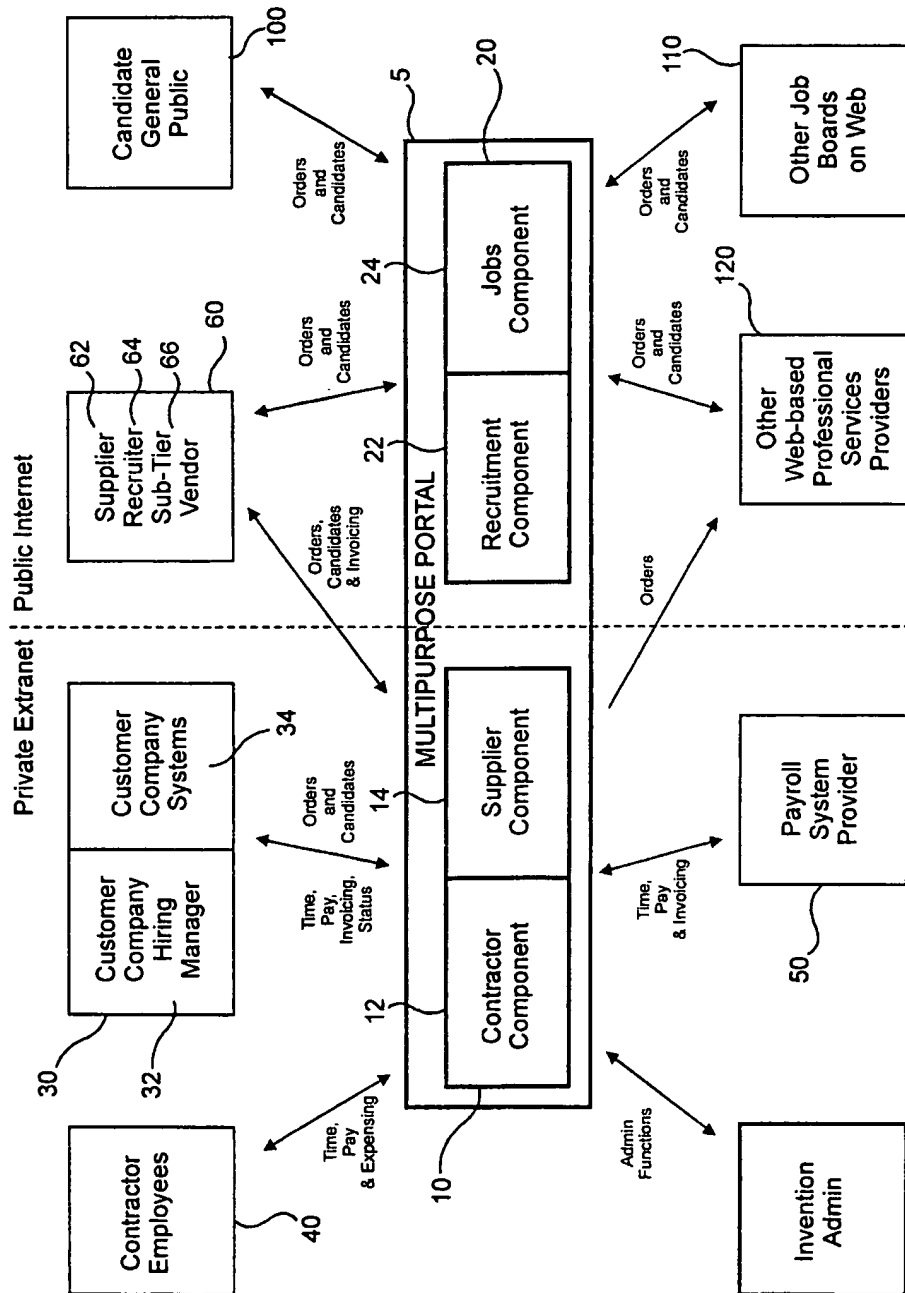


FIG. 1A

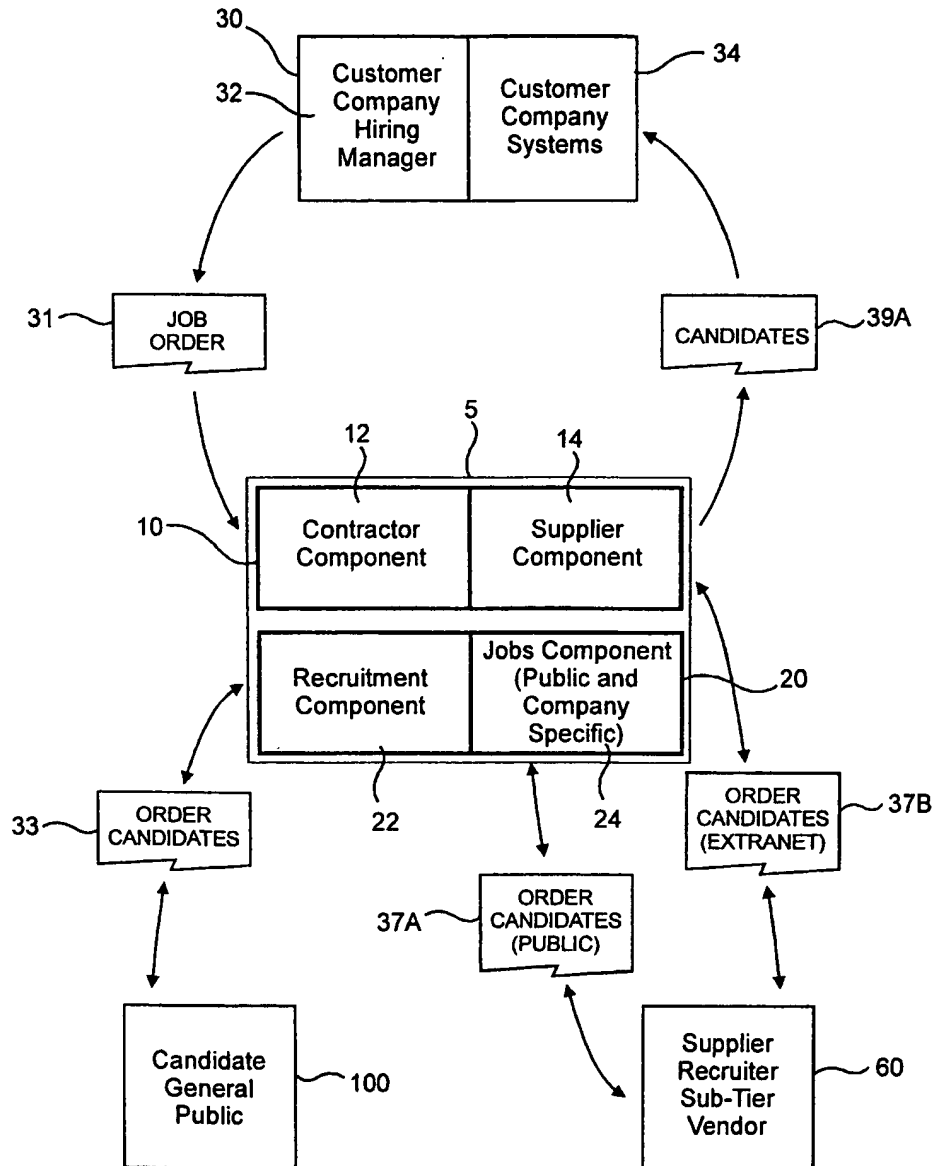


FIG. 2

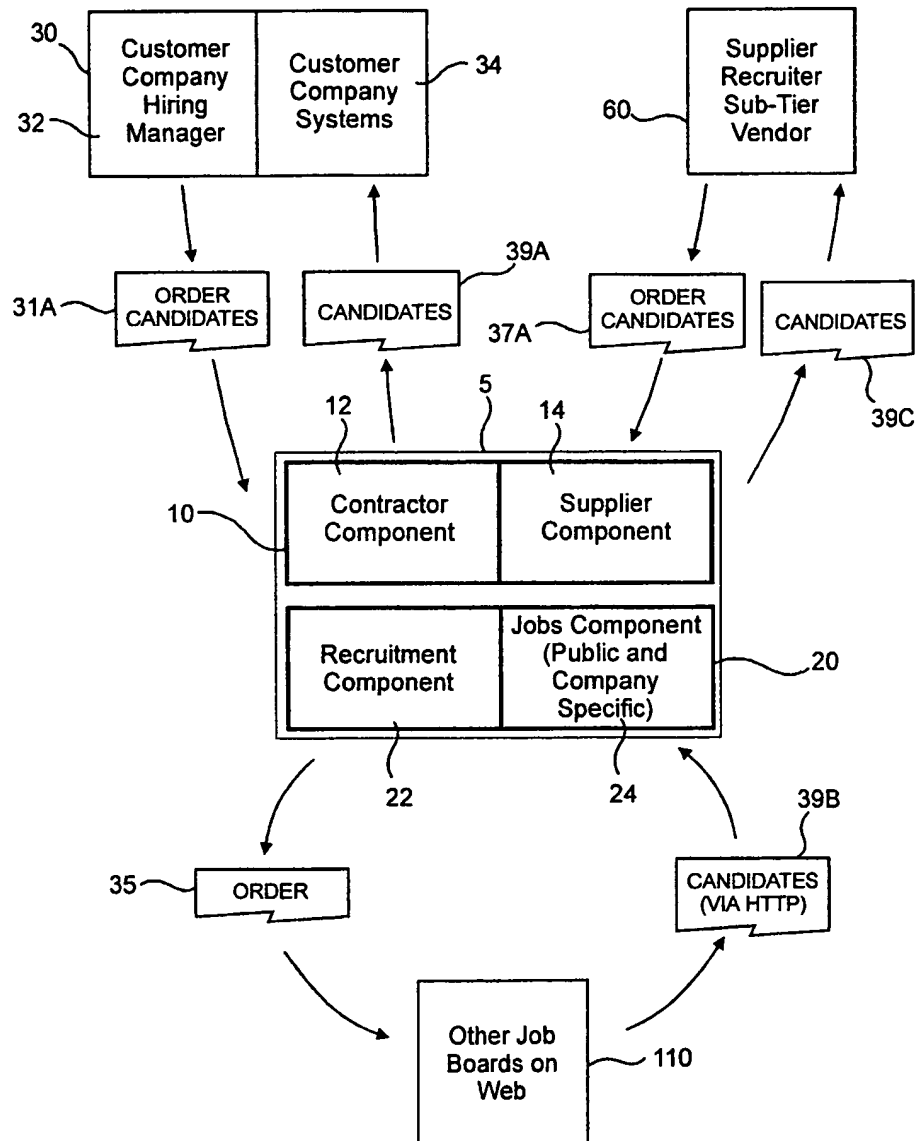


FIG. 3

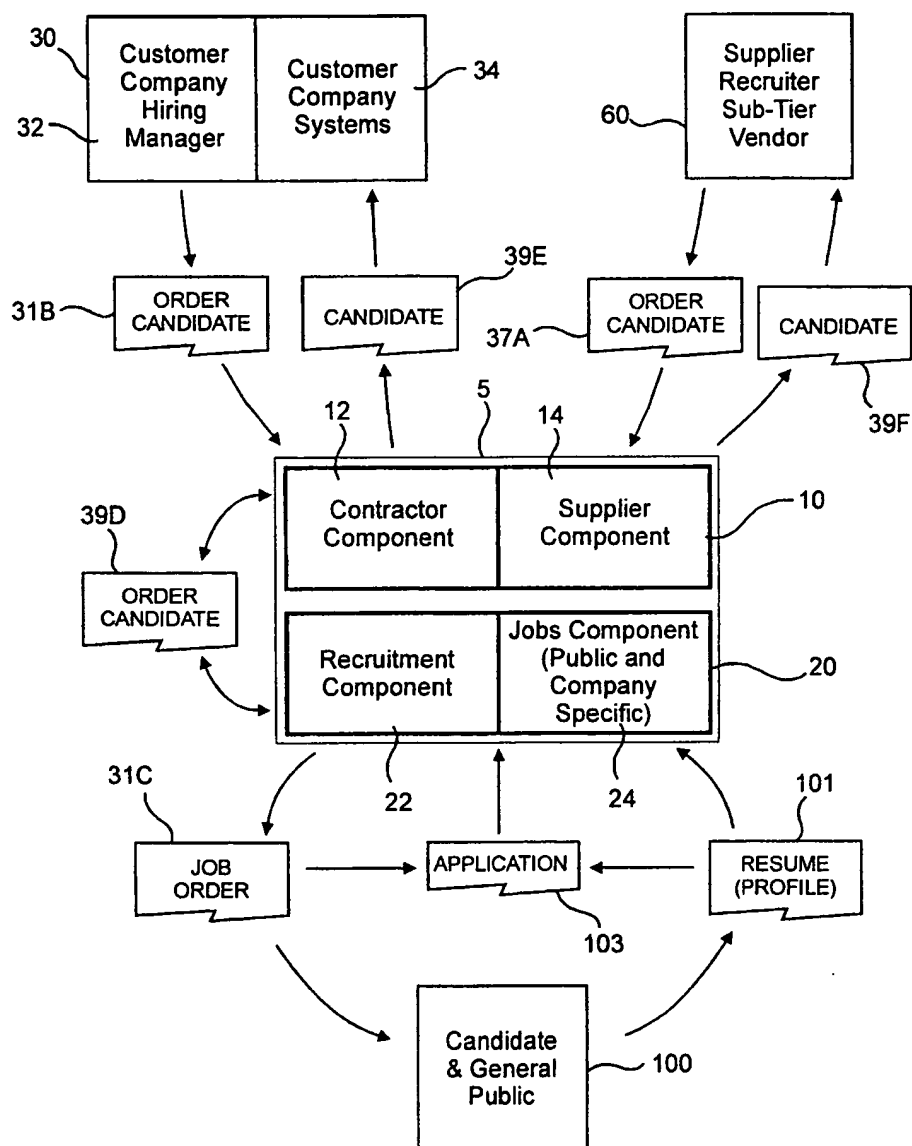


FIG. 4

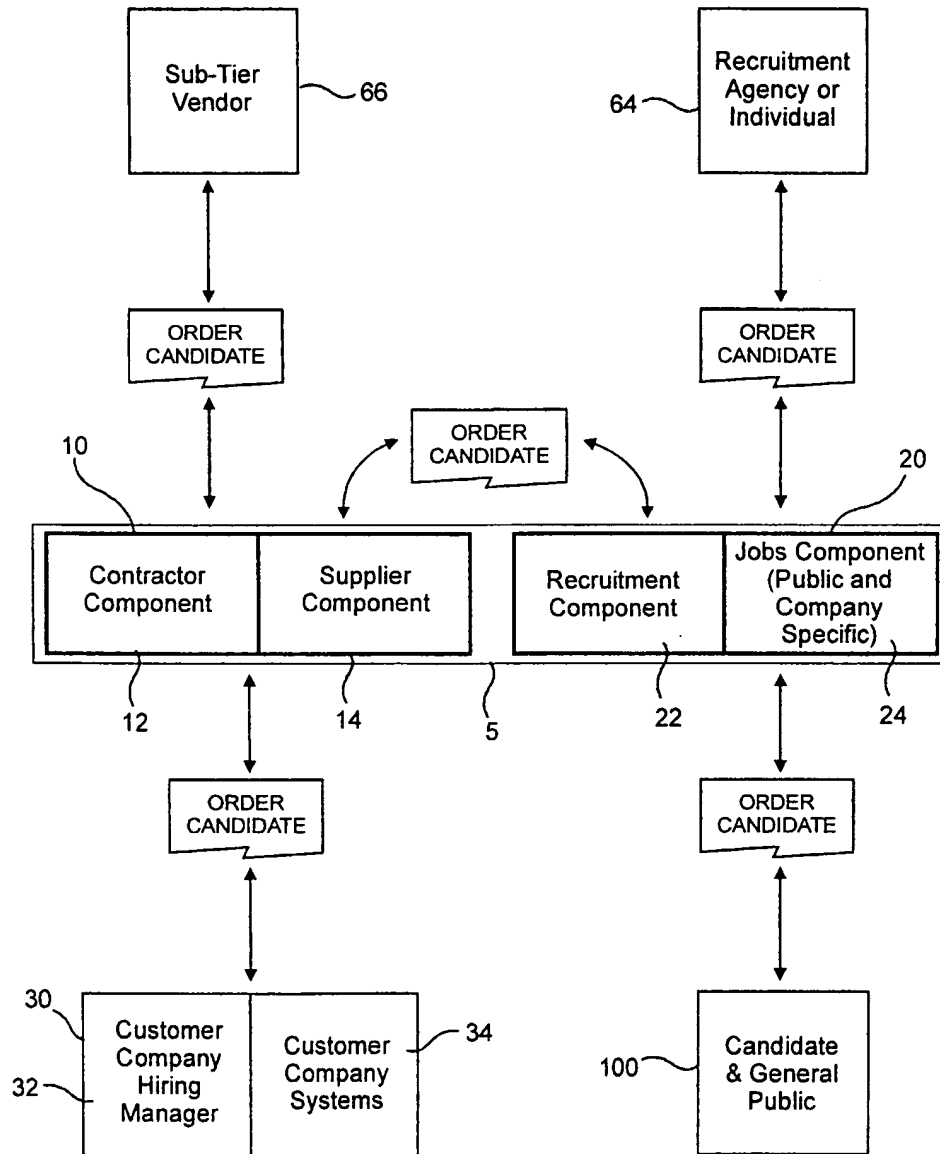


FIG. 5

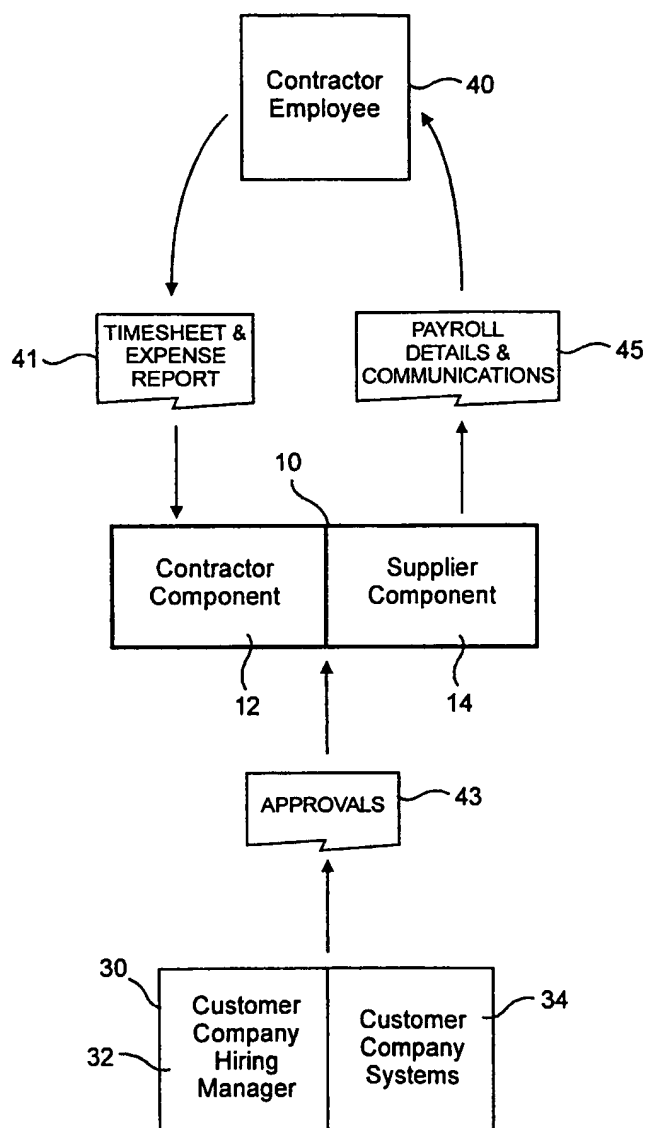


FIG. 6

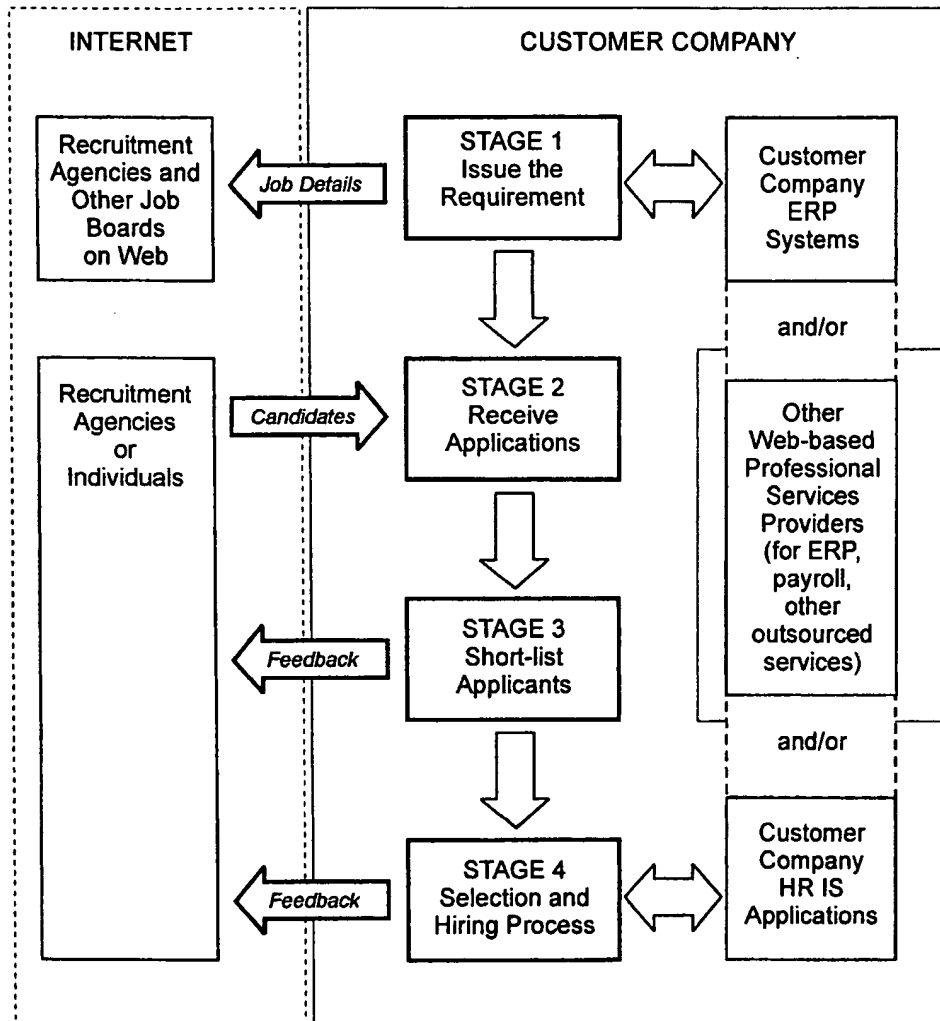


FIG. 7

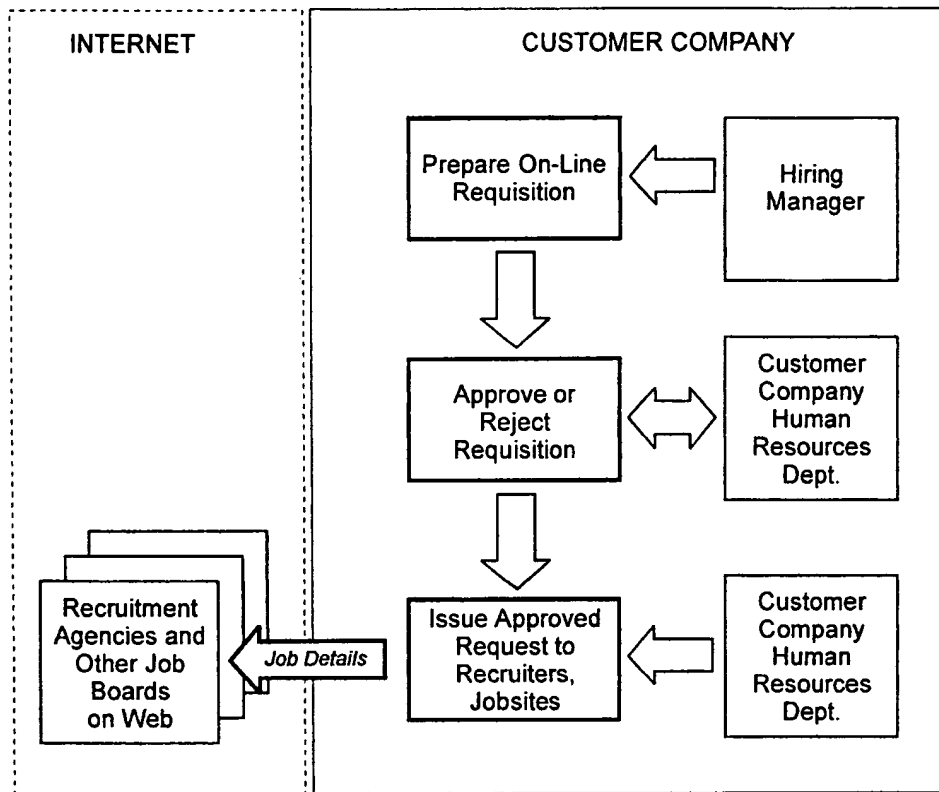


FIG. 8



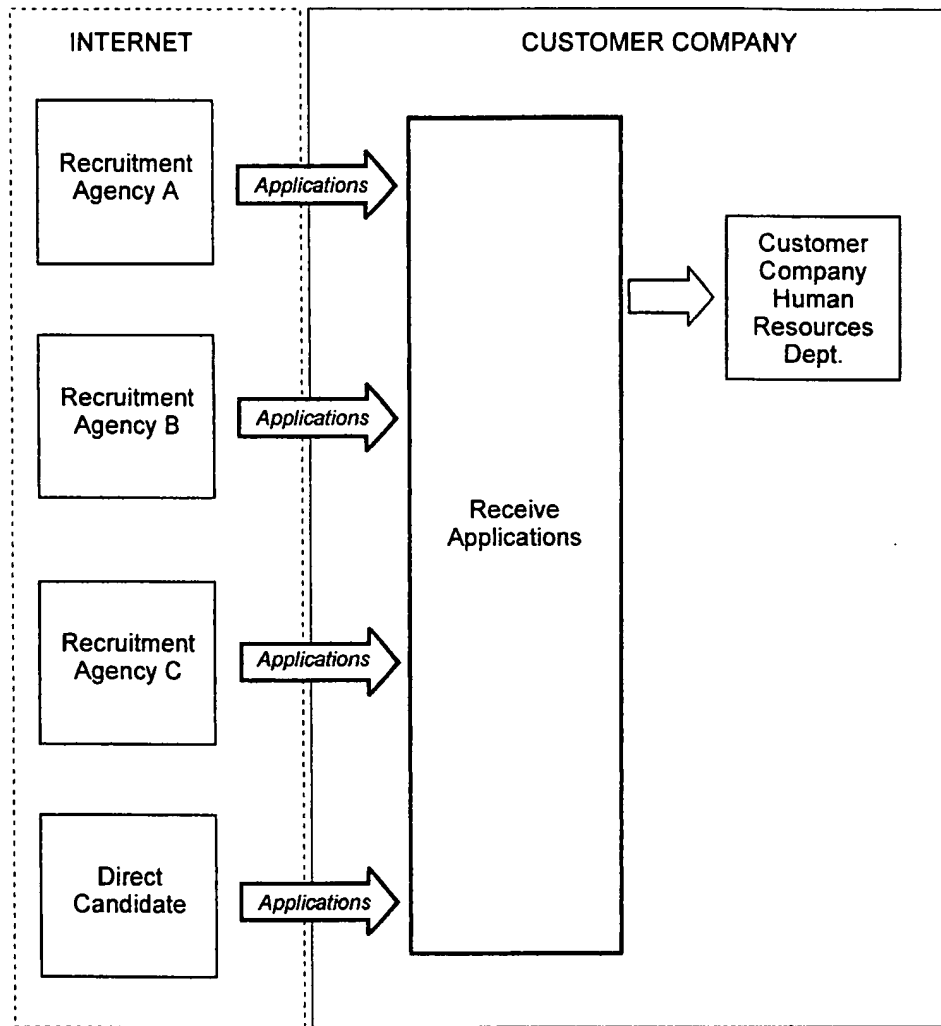


FIG. 9

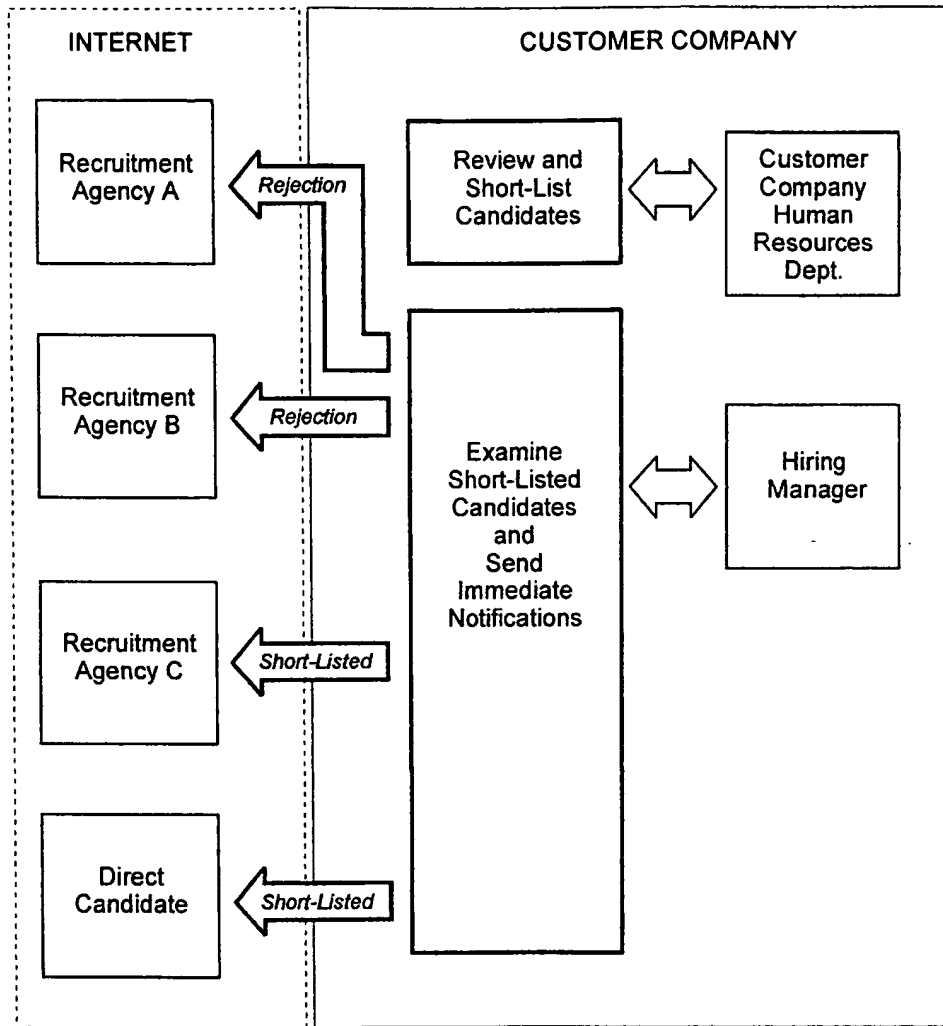


FIG. 10

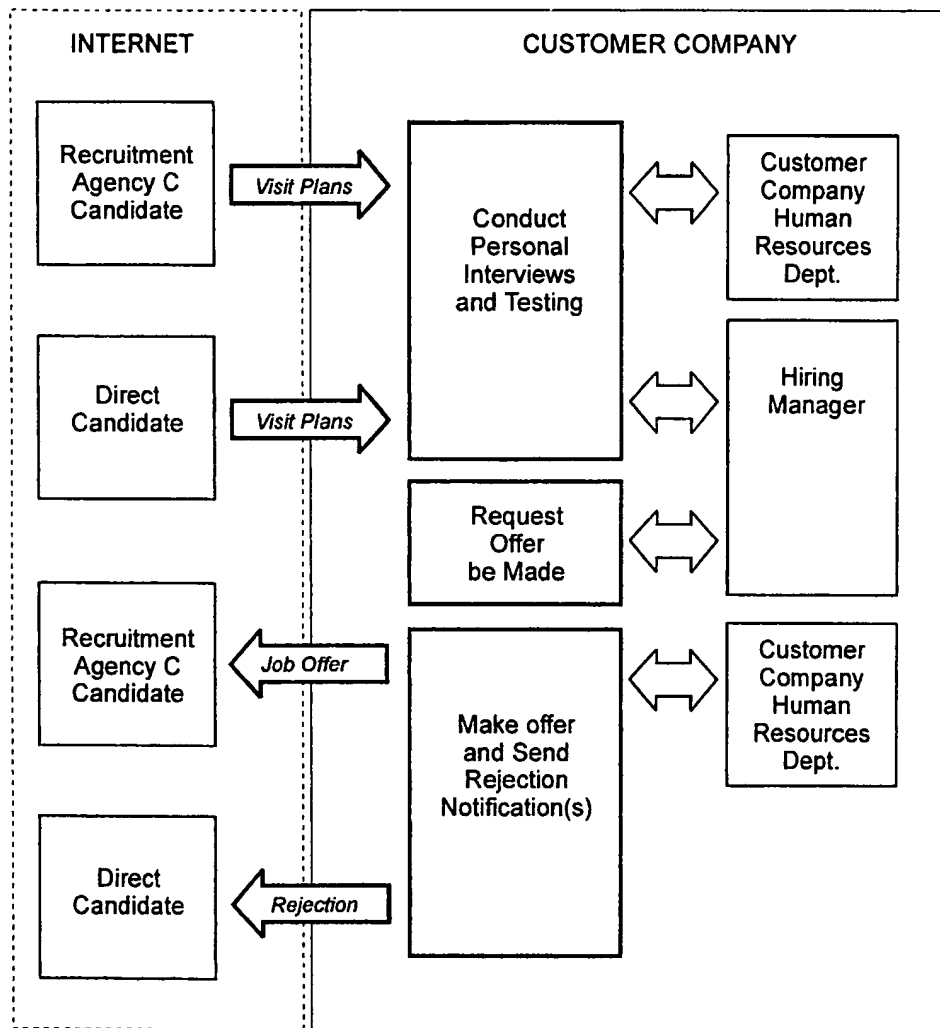


FIG. 11

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/17948

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) : G06F 17/60 US CL : 705/1 According to International Patent Classification (IPC) or to both national classification and IPC																										
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 705/1  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WEST, DIALOG, STN, EPO, JPO, IBM TDB and Derwent World Patents Index																										
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																										
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																								
X	WO 99/17242 A2 ( COOPER ET AL ), 08 APRIL 1999, Abstract, Figs. 1 and 5, page 6, lines 18, 20, 21 , 25; page 7, lines 15-20, 30-31; page 8, lines 7, 25-26; page 11, lines 24-25, 28-31, page 12, line 20 and page 13, line 1.	1-31																								
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.																										
<table border="0"><tr><td colspan="2">* Special categories of cited documents:</td><td>* T</td><td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td></tr><tr><td>* A</td><td>document defining the general state of the art which is not considered to be of particular relevance</td><td>* X</td><td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td></tr><tr><td>* E</td><td>earlier document published on or after the international filing date</td><td>* Y</td><td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td></tr><tr><td>* L</td><td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td><td>* A</td><td>document member of the same patent family</td></tr><tr><td>* U</td><td>document referring to an oral disclosure, use, exhibition or other means</td><td></td><td></td></tr><tr><td>* P</td><td>document published prior to the international filing date but later than the priority date claimed</td><td></td><td></td></tr></table>			* Special categories of cited documents:		* T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	* A	document defining the general state of the art which is not considered to be of particular relevance	* X	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	* E	earlier document published on or after the international filing date	* Y	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	* L	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	* A	document member of the same patent family	* U	document referring to an oral disclosure, use, exhibition or other means			* P	document published prior to the international filing date but later than the priority date claimed		
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* P	document published prior to the international filing date but later than the priority date claimed																									
Date of the actual completion of the international search 07 SEPTEMBER 2000		Date of mailing of the international search report 27 OCT 2000																								
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230		Authorized officer TOD SWANN <i>James R. Matthews</i> Telephone No. (703) 308-7791																								